

MEKDELA AMBA UNIVERSITY

DEPARTMENT OF PHYSICS

MATHEMATICAL METHODS OF PHYSICS II Worksheet-1

Individual Assignment(No#1a,b 3a, 7)

1. (a) Show that $A.(BxC)=B.(AxC)=C.(BxC)$

(b) Show that $Ax(BxC)=B(A.C)-C(A.B)$

2. By the method of Gaussian elimination, solve the equation $Ax=b$

$$\text{Where } A = \begin{pmatrix} 1 & -2 & -4 \\ 2 & 1 & -3 \\ 1 & 3 & 2 \end{pmatrix} \text{ and } b = \begin{pmatrix} -3 \\ 4 \\ 5 \end{pmatrix}$$

3. Find the inverse of $A = \begin{pmatrix} 3 & 2 & 1 \\ 2 & 2 & 1 \\ 1 & 1 & 4 \end{pmatrix}$

4. Solve the following sets of equations by Gaussian elimination

a. $x_1 - 2x_2 - x_3 + 3x_4 = 4$

$$2x_1 + x_2 + x_3 - x_4 = 3$$

$$3x_1 - x_2 - 2x_3 + 2x_4 = 6$$

$$x_1 + 3x_2 - x_3 + x_4 = 8$$

5. Solve the following sets of equations using inverse method

a. $3x_1 + 2x_2 - x_3 = 4$

b. $4x_1 + 5x_2 + x_3 = 2$

$$2x_1 - x_2 + 2x_3 = 10$$

$$x_1 - 2x_2 - 3x_3 = 7$$

$$x_1 - 3x_2 - 4x_3 = 5$$

$$3x_1 - x_2 - 2x_3 = 1$$

6. Prove the cosines law starting from $A^2 = (B-C)^2$

7. Three vectors A, B and C are given by $A=(1,-2,1)$ $B=(0,1,1)$ and $C=(0,1,1)$ then find $Ax(BxC)$, $Cx(AxB)$, $Bx(CxA)$ and $A.(BxC)$.

8. Given $A = \begin{pmatrix} 0 & -5 & -4 \\ 2 & 1 & -8 \\ 1 & 6 & 2 \end{pmatrix}$ and $B = \begin{pmatrix} 10 & -2 & -5 \\ 2 & 11 & -3 \\ 9 & 2 & 4 \end{pmatrix}$ then find AB , $7A$ and $A+B$

9. What is vector space?

10. Define singular matrices, co-factors unit matrix

11. Write at least 7 properties of vector and give an example for each.

12. Find the (a) scalar product and the (b) vector product of the vectors

$$A=2i-5j+4k \text{ and } B=i+4j-7k$$